1993

A Review of Functional Assessment Instruments

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A REVIEW OF FUNCTIONAL ASSESSMENT INSTRUMENTS

by

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Bachelor of Science in Physical Therapy
University of North Dakota, 1992

An Independent Study

Submitted to the Graduate Faculty of the

Department of Physical Therapy

School of Medicine

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Master of Physical Therapy

Grand Forks, North Dakota
May
1993

This Independent Study, submitted by Kristen N. Weich in partial fulfillment of the requirements for the Degree of Master of Physical Therapy from the University of North Dakota, has been read by the Faculty Preceptor, Advisor, and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.

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Degree Masters of Physical Therapy

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ABSTRACT

Formalized functional assessment, in the form of data that is uniform and complete, is desirable for objective and explicit documentation of functional improvement. A variety of functional assessment instruments are currently being utilized in the field of medical rehabilitation. However, there is not professional clarity as to which functional assessment instrument is optimal.

The concept of functional assessment is described. An overview of existing functional assessment instruments is presented. Criteria for evaluating the adequacy of functional assessment instruments is discussed.

There is no one best approach to assessing physical function. No instrument is perfect for all patients or all situations. Physical therapy departments must carefully consider which functional assessment instrument is appropriate for their institution or specific patient population and then adopt that measure.

CHAPTER I

INTRODUCTION

Chronic illness and long-term physical and mental impairments are major health problems in the United States today.[1,2,3] Approximately thirty-five million individuals suffer from physical or mental impairments that limit their capacity to perform some daily functional activity.[1] Factors such as lowered mortality from infectious and acute illnesses, increased longevity, and survival of those who are impaired have increased the prevalence of persons with disability and functional limitations associated with those impairments and related health conditions.[2,3] Stroke alone, which is a common diagnosis seen in the rehabilitation setting, represents a major cause of disability in the U.S., affecting an estimated 1,750,000 individuals and causing an estimated 180,000 deaths each year.[1] Stroke patients constitute an increasing challenge to the health care system due to their large number, their marked degree of disability, and their high consumption of health resources.[4] Treatment, in a rehabilitation context, is not aimed at the eradication of the disease process or at the relief of symptoms. Instead, its primary target is the minimization of the functional and social consequences of the disease once it has stabilized.[1-3,5-8] Earlier concepts of rehabilitation were concerned with a narrow, pathology-oriented view of the individual, so too were the earlier assessment concepts or tools. Traditional methods of medical diagnosis and classification of disease proved to be of little value in setting up treatment strategies.[3]

Because the concept of rehabilitation has changed, modifications of traditional assessment strategies are needed to keep pace with these modern developments. There is a need to meaningfully define and measure the functional status of rehabilitation patients.[2,3,5-8]

The process of modern rehabilitation medicine is a complex multidisciplinary system and includes a diverse variety of diagnoses seen. Examples of this diversity of diagnoses include: total hip replacement, amputation, stroke, traumatic brain injury, multiple sclerosis, spinal cord injury, and Parkinson's disease. The outcome sought is, regardless of the diagnosis, simply stated: maximal increase in function for the individual patient or client.[1-3] For a patient with a fractured arm, this process may be relatively simple. For a patient with a stroke or head injury, the task is much more complex because the problems are more extensive and complicated. In both instances, the therapist begins with a systematic assessment of each body system, planning treatments to reduce or eliminate the problems. In the end, the final common denominator for assessing the success of each program is the attainment or reattainment of optimal function. At this point in time, precise description of the target values of this end point has defied agreement.[2,3]

In the past, definition of the outcome of the rehabilitation process all too often was left to the impreciseness of such words and phrases as "rehabilitated", "successfully rehabilitated", "did well in the rehabilitation program", and "achieved maximum rehabilitation benefits."[6] Use of general phrases by the professionals in the field of rehabilitation implies to others that rehabilitation is a single, universally applied process that can be prescribed, applied and achieved with a minimum of thought and effort.[3] Those in the field realize that the rehabilitation process is tailored to the needs of the individual patient and goals may be several, varying from teaching the patient to walk with aids to helping the patient achieve functional, vocational, and

social independence. If the professionals in rehabilitation medicine hope to communicate with other professionals and paramedical personnel, they must stop using generalities of this sort and begin to talk as scientists. Preciseness is needed in describing the patient's initial disability and the treatment goals intended, and accuracy is mandatory in the measurement of the changes effected in patients.[6]

The problems of measuring progress or of describing the end result of a rehabilitation program are extremely complex because rehabilitation medicine concerns itself with an almost overwhelming gamut of variables.[6] If the physiatrist could cure his/her stroke patients, as the physician does in dealing with the acutely ill patient, or as a surgeon does in dealing with a specific impairment such as a nonfunctioning gallbladder or a tumor, then the success of rehabilitation programs could be measured. If there existed only a simple univariate criterion, such as returning to full-time employment, outcome of treatment could be easily defined. Because rehabilitation medicine encompasses concepts and techniques identified with many other medical specialties and concerns itself also with sociologic, vocational, and psychologic implications of disability, only rarely can univariate criteria be used meaningfully to measure progress or to define outcome.[6]

There already exist specific measures for all of the component parts of each medical and paramedical rehabilitation specialty. The physical therapist, for example, has well defined procedures for measuring joint mobility and muscular strength; the occupational therapist has tests of upper extremity strength, speed and skill; the speech pathologist has tests that measure abilities in speed and language; and the psychologist and social worker utilize a number of tests to measure or identify specific traits. Additional and improved measures are still needed in many if not all of the specialty areas. However, because rehabilitation today is concerned

with problems associated with environmental functioning and adaptation, there is also a need for comprehensive measures that reflect the ability of the patient to function independently within his/her environment.[2,3,5-8]

Functional assessment is a means for health care workers to measure this function. Functional assessment is the measurement of a persons ability to perform daily life activities for the purpose of determining appropriate treatment and services.[9] Lawton[2(p14)] offered the following definition: "Functional assessment means any systematic attempt to measure objectively the level at which a person is functioning in any of a variety of areas such as physical health, self-maintenance, quality of role activity, intellectual status, social activity, attitude toward the world and toward self, and emotional status." Functional assessment is accomplished via a test or battery of tests, the results of which can be used as 1) an information base for setting realistic function-oriented treatment goals, 2) an indicator to the patient of current abilities that document progression toward more complex functional levels, 3) an index for decisions on admission and discharge from a rehabilitation or extended care facility or to determine needs for community services, 4) a guide for determining the safety of an individual in performing a particular task and the risk of injury with continued performance, and 5) a formalized instrument to assess the effectiveness of a specific treatment intervention on function. More recently the use of functional assessment instruments has emerged as a recurring theme in the search for an appropriate payment system for medical rehabilitation hospitals and units.[3,10,11] Conceptually, functional status measurement is important because the primary goal of medical rehabilitation is to enhance physical function and independence. Studies indicate that functional status and functional gain are among the best predictors of resource utilization at rehabilitation facilities.[12-14] Formalized functional assessment is desirable for objective and explicit documentation of functional improvement.

There is a need to examine quantifiable standards and norms in rehabilitation medicine. medicine.[2,3,7] Lack of definable goals, quantifiable utilization criteria or predictable outcomes has hindered appreciation for, and financing of, rehabilitation services.[15] The information found in narrative form in the individual patient's chart is of limited use for this purpose because of incompleteness, lack of standard terminology, subjectivity, and unsuitability for aggregation and statistical analysis. Efforts to develop formalized functional assessment techniques are an integral part of the maturation and growth of organized medical rehabilitation. Methods are being sought to document functional improvement unequivocally, thereby providing objective evidence of successful outcomes in the form of data that are uniform, complete and appropriate for aggregation.[2] Such documentation is needed for utilization review and third party payment justification both for treatment of the individual patient and for program planning and evaluation of facility. In addition, functional assessment facilitates the process of professional education and communication between rehabilitation professionals and between institutions and agencies.[2,6]

The purpose of this paper is to provide an understanding of the concept of functional assessment. A review of the functional assessments that are currently being utilized in rehabilitation will be presented in order to critically analyze and select appropriate assessment instruments for particular patients and settings.

CHAPTER II
CONCEPTUAL FRAMEWORK

Development of a functional perspective for analysis of the consequences of a health problem requires conceptual understanding and clarification of the concept of functional status and the concepts and relationships between impairment, disability, and handicap. A conceptual framework is necessary to fully understand the concept of health and functional disability.[1,2,3,7]

There is no clear consensus on what is meant by the terms "function" or "functional status" either within medical rehabilitation or in related health fields. The term function has assumed numerous and diverse meanings in the health fields. Function has been used to describe the characteristic action of body parts, i.e. , the function of the shoulder; the performance of organs, i.e., kidney function; as well as the performance of the individual, i.e., as functioning in activities of daily living.[7] Webster[16(p920)] defines function as "the activity appropriate to the nature or position of a person or thing - the normal and specific contribution of any bodily part (as a tissue, organ, or system) to the economy of a living organism."

To understand the concept of functional status, a discussion of the broader concept of health is necessary.[1,7] The World Health Organization(WHO)[17(p7)] defines health as "a state of complete physical, mental, and social well being, not merely the absence of disease and infirmity." Such a global definition may be sufficient for communicating the idea to the public. However, it is overly simplistic, abstract, and it lacks precision necessary for clinicians or researchers who are seeking ways to study this concept scientifically.[18]

Investigators who have attempted to define health in more measurable terms have focused traditionally on one or more of the following three concepts: 1) physical manifestations or signs, 2) symptoms, and 3) functional status.[1,2,7] More recently, the World Health Organization adopted an International Classification of Impairment, Disability, and Handicap (ICIDH).[17] The goal was to promote the use of consistent terminology and to provide a framework for discourse among health professionals. The definitions presented in this paper are reflective of that classification system. The definitions of three terms (impairment, disability, handicap) will be discussed first, as they are important throughout this paper.

Impairments evolve as the natural consequence of pathology or disease. They are defined as "any loss or abnormality of anatomical, physiological, or psychological structure of function."[17(47)] Impairment is characterized by temporary of permanent losses or abnormalities that include the existence or occurrence of an anomaly, defect, or loss in limb, organ, tissue, or other structure of the body, including the systems of mental function. Impairment represents exteriorization of a pathological state, and in principle, it reflects disturbances at the level of the organ."[17(47)]

A disability is "any restriction or lack of ability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human. Disability is concerned with abilities, in the form of composite activities and behaviors, that are generally accepted as essential components of everyday life."[17(p143)] Examples include disturbances in behaving in an appropriate manner, in personal care such as excretory control, in the performance of other activities of daily living, and in locomotor activities such as the ability to walk.

The third term, handicap, is defined by the World Health Organization as "a disadvantage for a given individual, resulting from an impairment of a disability, that limits or prevents the fulfillment of a role that is normal (depending on age, sex, social

and cultural factors) for that individual."[17(p183)] Handicap is concerned with the value attached to an individual's situation or experience when it varies from the normal. It is characterized by a disagreement between the individual's performance or status and the expectations of the individual himself/herself or of the particular groups of which he is a member. Handicap represents socialization of an impairment or disability. It reflects the consequences (cultural, social, economic, environmental), for the individual, that stem from the presence of impairment and disability. "Disadvantage arises from failure or inability to conform to the expectations of norms of the individual's universe. Handicap occurs when there is interference with the ability to sustain what might be designated as survival roles."[17(p183)]

Nagi, Wood, and Badley have been influential in developing models that explicate health status and disability.[1,2,3] The following is an explanation of a combined model of their work. This conceptual framework used for understanding health status begins with the pathology or disease process that mobilizes the body's defenses and response mechanisms. Impairment follows disease with physical signs and symptoms stemming from the two. Functional disability follows impairment in the model and handicap is at the end.[1] Physical signs and symptoms indicate the body's attempts to cope with this attack on its normal functioning.

Physical signs, the first concept, are the directly observable or measurable changes in an individuals organs or systems that can be observed or assessed by another individual.[1,7] Laboratory blood analyses, body temperature, and blood pressure are all examples of observable, measurable characteristics. Most physical manifestations of concern to physical therapists fall into the category of impairment. Physical therapists are primarily concerned with impairments of the musculoskeletal, neuromuscular, and cardiopulmonary systems.[2]

Symptoms, the second concept, are the more subjective reactions to the change experienced by the individual. Symptoms are usually not observable by another person.[1, 7] Examples of symptoms are complaints of pain, dizziness and nausea. Symptoms are essential health parameters to physical therapists. The reduction of pain, for instance, is one of the most important treatment goals for many patients with chronic disorders.

The exclusive emphasis on physical signs and/or symptoms as indicators of health reveals an underlying assumption that health represents the absence or eradication of illness. Until recently, signs and symptoms have been the primary health indicators of what is frequently called the "medical model" approach to defining health.[1,2,7] Focus on the traditional medical model may result in the medical labeling of individuals: for example as amputees, paraplegics, arthritics or strokes. This model leaves no room within its framework for the social, psychological, and behavioral dimensions of illness.[1] The restricted utility of the medical model appears to be due, in part, to lower priorities in caring for patients compared to curing them and due to limits in the "state of the art" in medical practice with respect to chronic conditions. Caring rather than curing requires a different problem-solving approach to clinical practice. Medical practice needs to go beyond the removal of disease as a mode of treatment, curing, to the more burdensome and less heroic and more person-oriented level of managing the treatment of patients, caring.[2]

The reduced mortality from infectious and acute illnesses, the increased longevity of those who are impaired by those illnesses, and the survival of those impaired by congenital disease have inevitably shifted the appropriate focus of medical attention.[2] This focus used to be primarily on disease, the identification of its causation, and its characteristics, now is much more likely to be on disablement or, more positively, on restoring and maintaining the independence of persons through

rehabilitation. This functional perspective should not be considered unique to formal treatment within rehabilitation medicine, but rather should be an integral part of any caring rehabilitation team's armamentarium.[2] Its goals should be seen as restoring and/or maintaining independence.

The third concept, functional status, reflects an individuals reaction to a biological condition; it represents the interaction of the individual with his or her environment. In assessing function, attention is paid to the individual, not to the pathological state of the organism. Therefore, examination of functional status is a broad-based, multidimensional process that must be linked to the other tests and measurements used by a physical therapist in assessing a patient.[7] The functional status of the individual represents one aspect or dimension of health. Physical manifestations and symptoms are related but distinct dimensions.

To define an individual's functional status for clinical or research purposes, an individual's function is subdivided into four main categories: physical function, mental function, affective function, and social function.[1,7] Physical function is the dimension of functional status that has received most attention from physical therapists. Physical function refers to sensorymotor skills that are necessary for performing usual daily activities. Walking, climbing stairs, getting in and out of bed, and bathing are examples of physical performance. Tasks concerned with fundamental daily activities such as the self-care skills of feeding, dressing and hygiene are usually defined as basic activities of daily living (BADL). More complex or advanced tasks are called instrumental activities of daily living (IADL).[1] Examples include managing personal affairs, cooking, shopping, home chores and driving. Mental function, the second functional category, refers to the intellectual or cognitive abilities of the individual. Factors such a initiative, attention, concentration, memory, problem solving, or judgment are important components of normal mental functioning. Affective function refers to a persons affective skills and effectiveness in coping with

life's everyday stresses as well as the more traumatic events each person encounters over a lifetime. Factors such as self-esteem, attitude toward body-image, anxiety, and depression are examples of affective functions. Social function, the final dimension, encompasses an individual's social interaction and performance of social roles or obligations. Parenting or being employed outside of the home are two of the many examples of an individual's function in social roles. The term handicap is frequently used when referring to disruption in an individual's ability to perform accepted social roles.

In summary, the conceptual meaning of the term functional status has been clarified. Functional status is one component of the larger concept of health status. It refers to the characteristic performance of the individual. Function reflects one's reaction to a biological condition; it represents the interaction of the individual with his or her environment. Functional status can be further divided into four dimensions: physical, mental, social, and affective function. Analysis of function means identification and classification of functional abilities and activities and functional limitations. A functional limitation is a consequence of a health problem and represents an inability or abnormality of anatomical, physiological or psychological structure of function. This can lead to reduction in behavioral skills or performance of tasks (disability) or deficits in fulfillment of social roles (handicap).

It is clear that to understand disability and to manage a program of care effectively and efficiently for the person who is disabled is a complex responsibility. The process of care and rehabilitation can be made more manageable through the use of a system to assess functional abilities and activities that incorporates selected diagnostic, performance, and social role descriptors.[2] Functional assessment is a method for describing abilities and activities in order to measure an individual's use of the variety of skills included in performing the tasks necessary to daily living, vocational pursuits, social interactions, leisure activities, and other required behaviors. A comprehensive functional assessment could involve an endless array of multiple

variables. Consequently, only selected diagnostic descriptors, selected performance descriptors, and selected social role descriptors are used for the desired measures. The technique includes coding the component skills and tasks according to categories of activities required in daily living. The data are used to help formulate judgments as to how well these essential skills are used and to gauge the degree to which tasks are accomplished and social role expectations are being met.[2] A clinician who is proficient in using functional assessment can obtain a performance-oriented database that can be analyzed with diagnostic descriptions of pathological conditions and impairment states. This integration of medical status, status in performance of tasks, and fulfillment of social roles, together with knowledge of the individual's level of social supports allows for the construction of a set of data that profiles the whole person. Given this profile derived from functional analysis of related sources of data, areas of need can be accurately identified and interventions and long-range coordination strategies can be developed that maximize personal independence and dignity. This type of database provides a framework for an orderly review of the needs at the organ, person, and societal levels that are important to use of skills, to accomplishment of tasks, to fulfillment of social roles, and to a satisfactory quality of life.[2]

CHAPTER III
REVIEW OF FUNCTIONAL ASSESSMENT INSTRUMENTS

To date, efforts toward formalized functional assessment methodology in clinical rehabilitation medicine have produced a number of specific instruments that can be grouped into three basic types. First, there are several global instruments that provide an overall functional profile of an individual. In this context, the term global means being relatively comprehensive with variable levels of detail regarding component items. Examples of these are the Functional Independence Measure (FIM), the Functional Life Scale (FLS), the Functional Assessment Inventory (FAI), and the PULSES.

Credit for the first major formalized functional assessment instrument, to be developed and widely used in American rehabilitation settings, belongs to Moskowitz and McCann[19] who published the PULSES in 1957. The authors recognized the need for a more structured approach to functional assessment. They first reviewed the writing of others with similar viewpoints and then developed and tested the PULSES.

The PULSES contains six subcategories, each represented by a letter in the name PULSES, with the patient being rated on an ordinal scale by specific criteria from 1 (essentially normal) to 4 (severely disabled and dependent). The subcategories are: overall Physical condition (P), self-care in terms of function of the Upper extremities (U), mobility in terms of Lower extremity function (L), Sensory intactness and communication (S), Excretory or bowel and bladder management (E), and psychosocial Status (S).[19]

The profile produced by rating the patient in each of these six subcategories achieves a reasonably comprehensive expression of that individual's overall functional status.[2]

The usefulness of the PULSES in formalized functional assessment has been demonstrated in many ways. In their original paper, Moskowitz and McCann[19] showed that their instrument could successfully classify 115 residents of a county home according to their levels of functional independence in addition to the traditional medical diagnostic categories. Two years later, Moskowitz and other colleagues[20] restudied the same group and were able to determine what had happened, in terms of functional levels, to each surviving member. They found that their data provided information of major clinical and administrative usefulness that could never have been inferred from traditional diagnostic descriptors alone. For the first time, questions relating to appropriate levels of care and service requirements could be answered with objective aggregate data. The technique also provided a means of documenting the success or failure of specific rehabilitation programs. Impaired and vulnerable patients could now be classified and monitored, both individually and in groups, according to their functional status.

Subsequently, Moskowitz and co-workers[21] have used the PULSES to classify and study the functional problems of 163 nursing home residents, including changes over a onr-year period. They also used PULSES for a three year longitudinal study of 518 persons from a stroke registry.[22] In addition to confirming the PULSES as an effective means of monitoring service requirements and the effects of rehabilitation efforts, they were also able to detect cases of unexpected functional deterioration where more intensive evaluation and intervention were needed. By 1972, the studies of Moskowitz and his colleagues had generated data, using the PULSES profile, on more than 3000 individuals with a variety of chronic illnesses

and, in so doing, they greatly enhanced our understanding of the functional, as well as the medical diagnostic, profile of this segment of the population.[2]

Other investigators have also found the PULSES to be a useful instrument for formalized functional assessment. Reynolds and colleagues[22] used the PULSES to classify 1480 residents of New York State nursing homes and county home infirmary patients in their 1959 survey of rehabilitation potential. They found the PULSES useful in registering the degree of disability, again noting that regular diagnostic categories did not provide this information. The most dramatic and extensive use of the PULSES has been that resulting from its incorporation into the functional assessment research in medical rehabilitation carried out by Granger and his associates.[24-27]

Granger published an adaptation to the PULSES in 1975. The usefulness of the instrument became further enhanced by: criteria revision to make the degree of need for assistance the consistent classifying variable throughout, and a scoring system that gives a numerical global score ranging from 6 (fully independent) to 24 (maximally dependent.). These added features allow the PULSES to generate data that, in aggregate form, are amenable to statistical analysis.[2]

Granger[26] first used the adapted PULSES in a follow-up study of 164 patients admitted to a hospital stroke unit during a period of one year. The adapted PULSES was found to be a useful means of grading overall functional deficit in each of these patients at the time of follow-up. In 1976, these studies were expanded, and the PULSES was included in developing the Long Range Evaluation System (LRES). The LRES is a computerized assessment method that measures functional ability and activities of patients and clients whose deficits are primarily in physical performance. The usefulness of the scored PULSES data in utilization

review, the enablement of statistical analysis of group experience with disability, and the close correlation of numerical PULSES and Barthel Index scores as measures of outcome were established.[25]

These relationships were studied more extensively in work published in 1977 which foresaw the possibility of setting up statistical expectations of functional outcome that could provide the basis for ongoing program evaluation and medical care audit.[27] The culmination of this series of studies was achieved in the classic 1979 paper by Granger et al.[24] which brought major recognition, throughout the field of rehabilitation medicine, of the value of formalized functional assessment in measuring the outcome of comprehensive medical rehabilitation. In this study, the PULSES instrument was shown to be valid, reliable, and sensitive to change. The PULSES was found to have a test-retest reliability of .87. The study compared the PULSES to the Barthel Index and the two scales were found to highly correlate. Validity was further enhanced by the demonstrated high correlation of the Barthel Index with the Kenny Self-care scale and the Katz Index. Also, an adapted PULSES score of 12 or more was demonstrated to be a useful operating definition of severe disability. Finally, it was noted that although the adapted PULSES lacks specific subscore detail in discrete ADL variables, its global nature makes it uniquely useful in measuring the overall degree of disability.

Although the PULSES appears to have been the global functional assessment instrument most frequently used in American medical rehabilitation, several others have been or are being developed. Only continued utilization and research will determine which of these will be most effective. A global functional assessment instrument that has been more recently developed is the Function Independence Measure (FIM).

The Task Force to Develop a Uniform Data System for Medical Rehabilitation was established in 1983 to meet a long-standing need to document severity of

patient disability and the outcomes of medical rehabilitation.[28] The Task Force was sponsored by the American Congress of Rehabilitation Medicine and the American Academy of Physical Medicine and Rehabilitation. A grant was obtained from the National Institute on Disability and Rehabilitation Research to develop a minimum data set that would be an appropriate, quickly and uniformly administered, valid and reliable measure, and would be discipline-free and acceptable to the clinicians in the field.[29] Data collected on key patient functional attributes in a consistent fashion allows clinicians, administrators and researchers to track patients from the beginning of hospital care through discharge and follow-up. Changes in patient performance over time can be measured and rehabilitation outcomes determined with periodic reassessment. The uniform data set is a useful tool to facilitate treatment monitoring and management, quality assurance, program evaluation, determination of care effectiveness and efficiency, and policy decision making.[29]

The Task Force reviewed 36 published and unpublished functional assessment instruments in order to select the most common and useful functional assessment items and to decide on an appropriate rating scale which would allow clinicians to assess the severity of disability in a uniform and reliable manner.[29] The Functional Independence Measure (FIM) was derived for this purpose. The FIM is intended to include a minimum number of items not to incorporate all the activities that would be possible to measure or that might be measured for clinical purposes.[29] It assesses self care, sphincter management, mobility, locomotion, communication, and social cognition on a seven-level scale. The data set also includes items which document patient demographic characteristics, diagnoses, impairment groups, length of hospital inpatient stay, and hospital charges.

Pilot, trial and implementation phase studies have been carried out since 1984 for the purpose of testing FIM for validity, reliability and precision in over fifty facilities

across the country.[30,31,32] Each phase resulted in useful modification of the FIM Guide, the data set, and definitions. The FIM was found to have face validity, to be reliable, and to have adequate precision.[30] Interrater reliability of the FIM was evaluated by comparing the results of multiple pairs of clinicians of differing disciplines, each pair assessing the same patient. The FIM total score intraclass correlation was .95. Face validity of the FIM was evaluated by means of specific questions regarding difficulty understanding, unnecessary items, items which should be added, and open-ended comments. The mean score on an evaluation question regarding adequacy of the FIM as a measure of severity of disability was 3.4 on a 5 point scale, which was in the better than average range.

The FIM has been designed to be used with a seven-level scale which represents major gradations in independent and dependent behavior. The underlying rationale for classifying an activity as independent or dependent is whether another person, or helper, is required and if so, how much help is required.[29]

The FIM is a measure of disability, not impairment. It is intended to measure what the subject actually does, not what he or she ought to be able to do. Severity of disability changes during rehabilitation so the change in FIM is an indicator of the benefit or outcome of care. The FIM was designed to be discipline-free which means it is a measure usable by any trained clinician, regardless of discipline. However, under some circumstances, certain clinicians may find it difficult to assess some activities. If that is the caseanother or several other more appropriate clinicians can participate in the FIM assessment of a patient and the assessment can be divided among them. [29]

The second group of functional assessment, and most frequently used, are the Activities of Daily Living (ADL) scales. These reflect the strong emphasis in the early stages of medical rehabilitation on achieving maximal independence in self-care

and mobility, enabling the patient to leave the institutional setting and continue other types of rehabilitation on an outpatient basis. Examples include the Barthel Index, the Katz Index of Activities of Daily Living, the Kenny Self-Care Evaluation, the Simulated Activities of Daily Living Examination (SADLE), the Time Care Profile (TCP), and the Klein-Bell Activities of Daily Living Scale.

The Barthel Index is probably the best known formalized functional assessment instrument in current American medical rehabilitation settings. This index was developed by Barthel, a physical therapist, and Mahoney,[32] a physiatrist, in the Maryland State Chronic Disease Hospitals, and was published in 1965. The Barthel Index includes 10 ADL variables in each of which the individual is scored by his or her degree of independence in performance. Its other distinctive features include a numerical scoring system (1-100) and different relative weights assigned to each variable on the basis of the authors own experienced clinical judgments. A Barthel score of 100 documents sufficient independence in self-care and mobility without the need for any attendant care for these basic needs. By the use of subscores for each variable, the Barthel Index permits retrieval of valuable detailed information when needed.[2]

Barthel and Mahoney[33] found the instrument to be of immediate value in the documentation of functional improvement. In their initial publication, they noted that it could be used to establish a functional baseline for a patient, follow his or her progress in a rehabilitation program, and identify a point of maximum benefit after which improvement did not occur. They also pointed out that when functional dependence is due, in part, to environmental factors, the correction of these will immediately result in a higher Barthel Index score. In addition, they explained their rationale for assigning a relatively heavy weight to the variable of continence because of its importance in personal care service needs and social acceptability.

The use of the Barthel Index to document progress in medical rehabilitation began even before its publication and has continued to the present. Wylie[34,35] recognized the potential value of the instrument and evaluated its validity in a study of 1025 patients with stroke. He found higher death rates in patients with lower scores, a positive correlation between score increases and independent clinical judgments of improvement, and generally lower scores in older patients. He also noted that patients with higher admission scores showed greater overall improvement which introduced the possibility of prioritization of functional prognosis. He concluded that the Barthel Index provided a valid measure of the degree of disability.

As with the PULSES, the utilization of the Barthel Index increased when adapted by Granger and associates[24-27] in the early 1970s and incorporated into study of functional assessments as outcome measures in medical rehabilitation. This work continued to demonstrate the usefulness of the modified Barthel Index as a feasible and objective means of scoring an individual's ADL status. In addition, major new uses were made of the aggregate functional assessment data made possible by the use of this instrument. These dimensions included: (a) the possibility of generating functional norms for medical rehabilitation programs, (b) demonstration of predictable relationships between functional status, levels of care, and discharge outcomes, (c) the potential usefulness of formalized functional assessment in prognosis, and (d) a new capability to permit more objective program evaluation in medical rehabilitation, both within and between institutions.[24-26]

A three-level adaptation of the Barthel Index was used in the major multicenter comprehensive needs study of severely handicapped individuals published in 1979.[24] This major and widely acclaimed study helped to firmly establish the Barthel Index as a valid and reliable index of ADL performance, sensitive to changes occurring over time, and useful with the entire spectrum of major physical

disability categories.[24] The Barthel Index was found to have a test-retest reliability of .89. As stated earlier, this study analyzed the PULSES and the Barthel Index and found the two scales to highly correlate. Validity was further enhanced by the high correlation of the Barthel Index with the Kenny Self-Care Scale. The Barthel Index has repeatedly achieved high correlation with other measures of functional status.[36]As Granger and colleagues continued their studies, the adapted Barthel Index has been incorporated by others into developing functional evaluation systems.[37]

In 1963, Katz and his co-workers[38] published the definitive form of their new functional assessment instrument, the Katz Index of ADL. It is one of the achievements of a series of meticulous studies of the behavior of chronic illness in aged persons carried out at the Benjamin Rose Hospital in Cleveland. The Katz instrument focuses on patient performance and the degree of assistance the six specific ADL variables of bathing, dressing, going to the toilet, transfers, continence, and feeding.[39,40] It is an ordinal scale that assigns an individual to one of seven ranks, A through G, according to decreasing levels of independence in ADL.

The Katz Index of ADL, very carefully developed and tested for reliability, was used originally to classify the self-care independence of 1001 elderly individuals with fracture of the hip, cerebral infarction, multiple sclerosis, arthritis, malignancy, cardiovascular disease, amputation, paraplegia, quadriplegia, and a variety of neurological diseases.[38] The authors found that the instrument was able to classify successfully 96% of this patient group. In addition, they noted the usefulness of the Katz Index of ADL as one basis for prognostic prediction, a potential measure for comparing treatment and control groups on a clinical trial, a means of focusing attention on functional deficits, and a guide to progress and treatment.

Finally, the third group consists of categorical instruments designed to address the unique functional profiles of patients with a particular disease or condition or which are limited to a single parameter. Examples include the Burke Stroke Time-Oriented Profile (BUSTOP),[41] the Quadriplegia Index of Function (QIF),[42] the Jebsen Test for Hand Function,[43,44] the Fugl-Meyer Assessment of Sensorimotor Recovery Following Cerebrovascular Acident,[45] and the Motor Assessment Scale for stroke patients (MAS).[46]

In addition to the several functional assessments discussed above, there are many other functional assessments that are being utilized today in rehabilitation medicine that have not been discussed in this paper. Also, numerous more functional assessments exist in quiet, unpublished use by rehabilitation facilities who still prefer to construct assessments to fit their particular situation. Since these methods have not been well developed, many assessment instruments have uncertain reliability and validity for clinical, research or program evaluation.

CHAPTER IV

ASSESSING THE ADEQUACY OF FUNCTIONAL ASSESSMENT INSTRUMENTS

Because of the vast assortment of functional assessment instruments available for use by the physical therapist, it is important for physical therapists to be able to determine the adequacy of these instruments. Instruments designed for various specific purposes differ in how completely they meet four necessary methodological criteria for the adequate measurement of functional status. These criteria are reliability, validity, precision, and feasibility.[2,7,47-49]

"A reliable instrument is one with small error of measurement, one that shows stability, consistency, and dependability of scores for individuals on the trait, characteristic or behavior being assessed."[48(p136)] According to Nunnally,[50] reliability is defined as the amount of variation measured by an instrument that is real, in other words, true differences between individuals and not error. Some degree of error is inevitable in virtually all forms of measurement. Systolic blood pressure, for example, can differ significantly from one measurement to another because of anxiety level, body position, and time of day the measurement is taken. Random error can never be completely eliminated from a measure; but to the extent that random error is slight, scores derived from that measure are stable, reproducible, or reliable.

There are three types of reliability including test-retest or intrarater, inter-rater or interobserver, and internal consistency or homogeneity.[2] Test-retest reliability refers to the stability of a score derived from one administration of a measure to another when administered by the same rater. Inter-rater reliability refers to the equivalence of scores derived from measures administered and scored by different raters. The

third type of reliability, internal consistency, assesses the extent to which different items in a particular measure or test are measuring the same characteristics.

The types of reliability which are important for each instrument depend on the type or purpose (descriptive, predictive, evaluative) of the instrument.[51] Obviously, each type of reliability is not pertinent in every situation. For example, test-retest reliability is a relevant issue when using a self-administered questionnaire type of instrument; interobserver reliability is not. Assessing interobserver reliability, however does become critical for measures that are administered by different individuals[2]. In their 1985 paper, Kirshner and Guyatt[51] have described the types of reliability which are important to assess for each of the three main purposes of functional assessments and which statistics are the most appropriate to use. The appropriate statistic depends largely on the type of data generated and on the purpose of the instrument. It is noted that test-retest and observer reliability are the important types of reliability to be evaluated in predictive and evaluative instruments as these instruments are used over time and often with more than one observer. The internal consistency with which an attribute is measured is more important for descriptive measures.

Variation among observers, subjects and instruments, and differences over time all contribute to unreliability in an instrument. The goal in developing an instrument is to minimize these sources of random and systematic error in the measurement process. This can be facilitated by using standard testing conditions and a standard administration procedure for the instrument.[48]

Validity can be defined as the accuracy of an instrument.[50] It represents the degree to which a test measures what it is intended to measure. The validity of an instrument is never proven. It can only be estimated, not directly measured.

Establishing validity is an ongoing process which can never be accomplished by just one or two research studies.[48] Three types of validity commonly used are: content, construct or concurrent, and criterion.[2]

Content validity asks whether an instrument represents the domain of the characteristics it claims to measure.[2] An instrument with content validity should measure every characteristic considered important by experts and which contributes to its purpose. Content validity rests mainly in expert judgment of the adequacy with which important content from a domain has been sampled and expressed in the instrument. It is basically judgmental and should not be relied upon as the sole criterion of a measures validity.[50]

Criterion or concurrent validity involves the comparison of scores on a new instrument with one or more other instruments known or believed to measure the concept of interest. To adequately demonstrate concurrent validity, the external criterion must be a superior, unimpeachable measure, a gold standard, if it is to serve as a verifying norm. Where a gold standard exists, the magnitude of the correlation between the new instrument and the gold standard is a direct indication of the new instrument's concurrent validity. If a gold standard is not available, construct validity must be established.[50]

Construct validity refers to the agreement of testing results with predetermined hypotheses.[51] An instrument has construct validity if the measurements of the attribute conform to prior theoretical formulations of relationships among characteristics or individuals.[50]

Another aspect important for an evaluative instrument is its responsiveness. A responsive instrument is able to measure small changes within an individual over time.[51] A clinician, for example, wants an instrument to be able to distinguish

increments of change that have clinical significance. Although the definition of clinical significance varies, it usually means a level of change that alters prognosis, therapy or intensity of follow-up.[2] Responsiveness should be determined for all instruments used in an evaluative manner. One method of assessing responsiveness is by measuring the change over time of an attribute in two groups: a group known to have changed and a group unlikely to change.[48]

The fourth necessary methodological criteria for the measurement of health status is feasibility. Feasibility becomes an important issue only after adequate levels of reliability, validity, and precision have been established for the instruments purpose. Data collection methods and breadth of the instrument should be considered when assessing feasibility of a functional status measurement.[2]

Functional status instruments rely mostly on one or more of the following methods to collect data: observation, structured interviews, self-administered questionnaires, clinical judgment, timed performance, or medical record audits.[1,2] Each technique has its advantages and shortcomings.[2] For instance, observing an individual's behavior is the most direct method of collecting data on function, however, it is time-consuming and frequently limited to assessing simple physical activities. Clinical judgment, self-administered questionnaires, chart audits and structured interviews are less direct measures and more subjective than direct observation. These methods have a greater chance of introducing error into the measurement process. Personal interviews and self-administered questionnaires can be useful to measure more complex dimensions of function but must be highly standardized to produce reliable scores. In using chart audits as the method of collecting data, the investigator has little or no control over the way in which the data were collected and recorded. Unreliability and missing information are common problems.[2]

The mode of data collection should be considered in determining the feasibility of a functional assessment instrument for specific application.[2,48] An instrument's reliability and validity, when used in one data collection mode, may not apply when the instrument is administered by another mode. What is reliable and valid in one form may not be in another. An instrument designed as a self-administered questionnaire used to measure an individual's sexual function, for example, may have been found to be reliable and valid but when used in a personal interview this may not hold true. If the mode of administration is changed, the instrument itself has been fundamentally changed.[2]

The breadth of an instrument must also be considered when determining an instrument's feasibility.[2,48] Long lists of functional activities included in some functional assessment instruments may not be practical in many clinical settings. In a 1980 article by Jette,[52] it is suggested that the length of functional status instruments can be substantially reduced by identifying and eliminating redundant items. Factor analysis and other multivariate structural analysis techniques may prove useful for developing relatively short, standardized instruments that will be precise yet feasible for use in clinical research and practice without having to make major sacrifices in the breadth of measurement coverage.

Other important considerations in determining the adequacy of a functional assessment instrument are: What is the purpose of the instrument (descriptive, predictive, evaluative)? What are the domains or categories that the instrument focuses on? What aspect of function is being measured (dependence, independence, length of time required to perform a task, degree of difficulty)? What is the time frame sampled in the assessment? Is the instrument standardized? Does the instrument have a manual to follow? What type of scoring system is used?[1,48,49,51]

CHAPTER V
CONCLUSION

In summary, a current trend in rehabilitation assessment is the development of functional assessment systems to augment traditional assessment strategies. This trend stems from a major shift in rehabilitation philosophy and practice. Today functional assessment methods are aimed toward classifying and evaluating patient's abilities to perform in their environment, and away from delineating diagnostic labels, traits, and aptitudes which characterized the traditional approach.

Functional assessment is accomplished via a test or battery of tests, the results of which can be used as 1) an information base for setting realistic function-oriented treatment goals, 2) an indicator to the patient of current abilities that document progression toward more complex functional levels, 3) an index for decisions on admission and discharge from a rehabilitation or extended care facility or to determine needs for community services, 4) a guide for determining the safety of an individual in performing a particular task and the risk of injury with continued performance, and 5) a formalized instrument to assess the effectiveness of a specific treatment intervention on function. Functional assessment instruments provide objective evidence of outcomes in the form of data that are uniform, complete and appropriate for aggregation. This information can be used for utilization review and third party payment justification at the level of treatment of individual patients and for program planning and evaluation at the level of total facility. In addition, function assessments facilitate the process of professional education and communication between rehabilitation professionals and between institutions and agencies.

A review of functional assessment instruments and of methodological criteria used to evaluate these instruments has been presented. This review points out clearly

that there is no one best approach to assessing physical function. It is important to remember that no instrument is perfect for all patients or all situations. No instrument is capable of assessing all the items potentially relevant to a particular individual or providing the perfect overall picture of a patient's functional status. Each of the instruments available has various strengths and weaknesses. Physical therapy departments must carefully consider which assessment instrument to use for a particular application and then adopt that measure. The use of homemade functional assessment instruments should be discontinued because of their lack of critical methodological criteria such as reliability and validity. It is apparent that there are many factors to consider when determining the adequacy of a functional assessment instrument and when determining which instrument is appropriate for use in a specific setting or with a specific patient population. A consideration of the criteria described in this paper will help guide the physical therapist to the appropriate functional assessment instrument.

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